FACTOR AFFECTING STUDENTS ACCEPTANCE OF DIGITAL REFERENCE SERVICES IN RESEARCH UNIVERSITY LIBRARIES

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ABSTRACT: *This study explored the acceptance of technology among postgraduate students within the context of Digital Reference Services (DRS) in research university libraries in Malaysia. The key objective was to identify the antecedents of DRS acceptance. The model identified the structural relationships among the constructs, which were examined through Structural Equation Modeling (SEM) with AMOS. The results of the analysis indicated a good fit for the proposed model, and the research findings also supported the positive and significant effects of performance expectancy, information quality, perceived enjoyment, subjective norms and IT infrastructure support on DRS acceptance. However, no significant relationship was found between effort expectancy, service quality, task compatibility and technical support with the acceptance of DRS.*

Keywords*: Digital reference service, effort expectancy, information quality, IT infrastructure supports, perceived enjoyment, performance expectancy, task compatibility, technical support, technology acceptance factors, service quality, Structural Equations Model and subjective norms.*

1. INTRODUCTION

At the current rate of development, many people are now concerned about gaining access to information in an Internet world. Therefore, regardless of the size and type of library, most libraries make use of the Internet and have tried to establish an effective presence. As digital libraries continue to evolve, it has become increasingly clear that most academic libraries are cognizant of the importance of the Internet and Information Communication Technology (ICT) as robust tools for the delivery of library services. Significantly, Nicholas claimed that in this modern day world, academic libraries cannot continue to operate without using ICT in the delivery of their services [1].

Digital reference services (DRS) over the Internet such as E-mail, Facebook, Web Form, Instagram, Twitter and etc. have become very popular and are being used increasingly by many libraries. DRS are initiated electronically, often in real-time, where users can communicate with the reference librarian 24/7 without needing to be physically present at the library for traditional reference services. These conveniences can serve as a key driver of DRS acceptance. As a result, the traditional user behaviour and attitude have been affected by new ways of interacting with the library, where previously the reference desk had been used. Therefore, their behaviour can no longer be predicted by the reference librarian. In addition, as more of the technology is developed, another form of DRS will emerge. Therefore, librarians need to take quick action to adopt the technology to meet user demands. This situation also acts as an impetus to conduct intensive studies in order to identify which factors may influence library users when considering the acceptance of DRS.

In addition, despite its significant potential for communication and library service marketing in particular, it is not clear whether the growth and development of Internet technology will lead to DRS acceptance. [2] stated that users who are familiar with Internet technology have shown little interest in applying it for library purposes. Therefore, it can be seen it has become critical for libraries to understand the factors that affect the acceptance of DRS due to the fact that there are two major sources for measuring the success of an information system (IS), namely user satisfaction and technology acceptance literature [3].

Since the success of DRS depends upon user acceptance of the technology, therefore, user acceptance should be the key concern of librarian. Thus, this study continues to extend the body of knowledge on the topic of technology acceptance by developing a more comprehensive model for measuring technology acceptance in the field of DRS within the context of libraries. This paper is organized as follows: In the next section, the research model and a summary of the literature review in the field of technology acceptance are provided. In Section Three, the methodology that guided the research is described. The data collection analysis and results are then described in Section Four. Finally, the paper concludes with the main findings.

2. THEORITICAL FRAMEWORK

In this section, the research model and a summary of the literature review in the field of technology acceptance are provided. The overall conceptual model is illustrated in Figure 1, and the sections which follow explain and justify each of the predicted relationships in the light of previous findings from the literature.

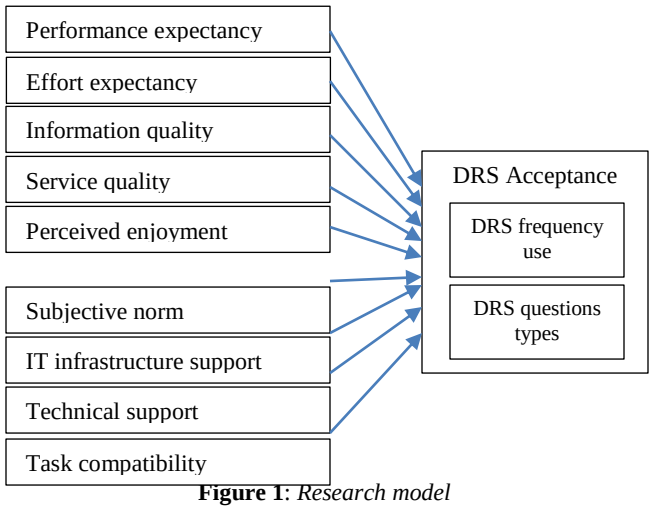

Figure 1: *Research model*

A. Performance Expectancy (PE)

Performance expectancy (PE) is defined as the degree to which an individual believes that using the system will help him/her to attain gains in work performance [4]. [5] had confirmed that PE has a positive influence on the user's intention to use, and behaviour while using, social media. This study further verified the theorized relationship between PE and the DRS context by using a direct, self-reporting measurement on the use of DRS. The justification was based on the fact that by using the help of DRS to answer reference questions and to fulfil user information needs, users can improve their work performance. This led to the following hypothesis:

H1a: There is a significant relationship between PE and the acceptance of DRS for frequent use.

H1b: There is a significant relationship between PE and DRS acceptance for type of reference questions.

B. Effort Expectancy (EE)

Effort expectancy (EE) can be defined as the degree of ease associated with the use of a system [4]. [6] had considered that EE as a critical component that affects the acceptance and use of an electronic library system. Thus, it has been found that EE

EE has a positive influence on the user's intention to use, and the behaviour while using, social media by [5]. In the context of the present study, it is still arguable that EE is an important factor that supports DRS acceptance. To this effect, this study posited that:

H2a: There is a significant relationship between EE and DRS acceptance for frequent use.

H2b: There is a significant relationship between EE and DRS acceptance for type of reference questions.

C. Information Quality (IQ)

According to [7], information quality (IQ) is determined by the output from the information system (including the accuracy of the information, timeliness of the output, reliability, completeness, relevance, precision and currency). Previous studies have proven that technology acceptance is influenced by IQ. For instance, [8] had found that IQ has a significant effect on the use of RFID systems in libraries. Meanwhile, [9] discovered that IQ is the greatest determinant of the usage of learning management systems by users with a confidence level of 99%. Thus, it was posited that:

H3a: There is a significant relationship between IQ *and DRS acceptance for frequent use.*

H3b: There is a significant relationship between IQ and DRS acceptance for type of reference questions.

D. Service Quality (SQ)

Service quality (SQ) refers to the overall support delivered by the service (including responsiveness, accuracy, reliability, empathy of personnel staff) [7]. Previous studies have indicated that SQ is linked to the acceptance of a technology. For instance, [10] mentioned that the SQ of websites is an important indicator that will affect library websites. Hence, it was posited that:

H4a: There is a significant relationship between SQ and DRS acceptance for frequent use.

H4b: There is a significant relationship between SQ and DRS acceptance for type of reference questions.

E. Perceived Enjoyment (PEN)

Perceived enjoyment (PEN) can be described as the extent to which "the activity of the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" [11 p. 1113]. [12] found that PEN is positively correlated with the dimensions of system usage such as time of use. In addition, [13] also had confirmed that PEN has a significant effect on various other dimensions including frequency of Internet usage, daily Internet usage and diversity of Internet usage. To this effect, it was hypothesized that:

H5a: There is a significant relationship between PEN *and DRS acceptance for frequent use.*

H5b: There is a significant relationship between PEN and DRS acceptance for type of reference questions.

F. Subjective Norm (SN)

A subjective norm (SN) is described as a person's perception that the majority of the people who matter to him are of the opinion that he should or should not perform a particular behaviour [14]. In the context of library studies [15] found SN had direct effects on the intention to seek information in an academic digital library. Meanwhile [16] also found a significant effect between SN and the digital library acceptance intention. Hence, this study hypothesized that:

H6a: There is a significant relationship between SN and DRS acceptance for frequent use.

H6b: There is a significant relationship between SN and DRS acceptance for type of reference questions.

G. Information Technology (IT) Infrastructure Support

According to [17], information technology (IT) infrastructure support refers to the shared technology platform, including the computer hardware, software and networking technologies that are necessary to adequately and appropriately implement information technology solutions throughout an organization. [17] also stated that IT infrastructure support is an important factor that encourages the acceptance and use of technology. Therefore, it was hypothesized that:

H7a: There is a significant relationship between IT infrastructure *support and DRS acceptance for frequent use.*

H7b: There is a significant relationship between IT infrastructure *and DRS acceptance for type of reference questions.*

H. Technical Support

Technical support (TS), as a type of end-user support that had positively influences the intention of computer users to adopt and use a technology by [18]. He also mentioned that TS is an important variable in determining the extent to which a technology is accepted or rejected by users. Hence, the availability of TS can lead to a higher rate of acceptance of a technology. To this effect, it was hypothesized that:

H8a: There is a significant relationship between TS *and DRS acceptance for frequent use.*

H8b: There is a significant relationship between TS and DRS acceptance for type of reference questions.

I. Task Compatibility

Task compatibility (TC) is defined as the match or uniformity between a task and the IS that supports that task [19]. Researchers, such as [20], measured work practice compatibility that included three sub-constructs (task compatibility, work flow compatibility, professional

compatibility) on user acceptance and the continued use of an online disability evaluation system. The results showed that on the whole, work practice compatibility is related to system use. Besides that, an analysis of data from empirical studies by [19] revealed that TC has a moderate level of support as a factor that influences overall IS success. To this effect, this study posited that:

H9a: There is a significant relationship between TC and DRS acceptance for frequent use.

H9b: There is a significant relationship between TC and DRS acceptance for type of reference questions.

DRS frequency is used to measure the DRS acceptance and the number of tasks (including directional questions, library policies/ procedure, ready reference: find known item, strategy based searching, connectivity questions, citation formatting/ citation management tools and manage copyright) was calculated to represent another dimension of usage.

3. RESEARCH METHODOLOGY

The research was quantitative in nature. A survey method was employed due to its advantages. To test the hypotheses of this thesis, structural equation modeling (SEM) using AMOS 21.0 (Analysis of Moment Structures) was conducted. The target sample for this survey was postgraduate students from 5 Malaysian research university (RU) libraries, who have already had experience in using DRS. The type of sampling design used in this study was disproportionate stratified random sampling, where each RU library was exactly represented in proportion to its size in the population. A total of 2294 self-administered questionnaires were distributed to the students, where 1497 respondents returned the questionnaires, indicating a response rate of 64.4%. However, only 1395 usable completed surveys. 503 of those surveyed had never used the DRS, thus resulting in 892 valid questionnaires which the respondents reported that they had experience with the DRS.

4. RESULTS

A. Descriptive Analysis of Sample

The gender statistics as illustrated in Figure 2 revealed that 41.4% (n = 369) of the respondents were males, and 58.6% (n = 523) were females. As shown in Figure 3, the largest number of respondents were in the age group of 25 – 29 years, i.e. 60.1% (n = 536). This was followed by 18.9% (n = 169) who were 30 – 34 years old, 9.5% (n = 85) who were 35 – 39 years old, 4.5 % (n =40) who were below the age of 24 years, 3.3% (n = 29) who were 40 – 44 years old, and only 3.7% (n = 33) who were above the age of 45 years. This showed that more than half (61.5%) of the DRS users were in the youngest age group (between 25 - 29 years old). As expected, the largest group of students, 69.8% (n = 623), were Master's students, and 30.2% (n = 269) were PhD students. The largest number of respondents were in semester 1 (n = 219), followed with 2(n = 212) and 3 (n = 153). In terms of the mode of study, 82.2% (n = 733) of the students were full-time and 17.8% (n = 159) were part-time students. Out of these students, 54.8% (n = 489) of them were living on campus and 45.2% (n = 403) were living off campus.

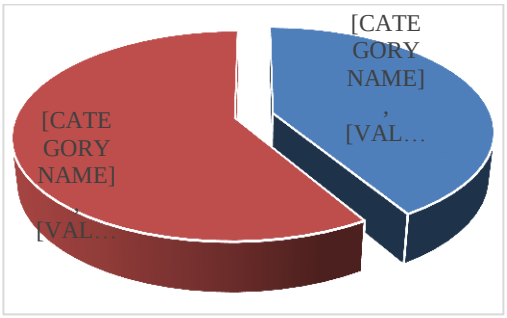

Figure 2: Gender

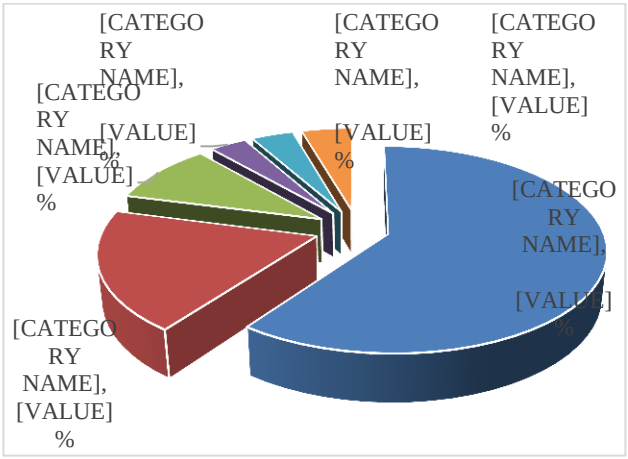

Figure 3: Age

Table 1 indicates the average mean score of descriptive statistics of all construct. Based on a seven-point Likert scale, all the average means score for each of the independent variables ranged from 4.72 to 5.31. Based on the outcome of the descriptive statistics, it was also discovered that the respondents of this study demonstrated a natural or slightly agree on their perception towards all the variables. The Cronbach's alpha before the confirmatory factor analysis was conducted was between 0.88 and 0.95 which is consider reliable measurement instrument.

Table 1: **An average of descriptive statistics for latent constructs**

Construct	Mean	Std. Dev.	Min	Max
Performance expectancy	5.31	1.00	2	7
Effort expectancy	5.00	1.00	2	7
Information quality	5.09	0.96	2	7
Service quality	4.98	0.95	2	7
Perceived enjoyment	4.96	1.01	1	7
Subjective norm	4.72	1.08	1	7
IT infrastructure support	5.03	1.07	1	7
Technical support	5.01	1.08	1	7
Task compatibility	5.07	1.02	2	7

B. The Structural Model Analysis and Hypotheses Testing

Figure 4 illustrated the measurement model of overall construct. As a result the estimated values of fit indices

showed a good structural model fit to the data for the proposed research model in this study. The indices for the overall goodness-of-fit demonstrated that this model fitted the data quite well, where the GFI = .854, NFI = .916, CFI = .944, TLI = .939, and RSMEA = .045. Hence it is concluded that the proposed research model fits the data reasonably. Factor loadings ranged from .62 to .91 for variables measuring PE, .74 to .90 for EE, .85 to .89 for IQ, .81 to .88 for SQ, .87 to .90 for PEN, .64 to .93 for SN, .90 to .94 for ITS, .88 to .95 for TS and .87 to .93 for TC. Meanwhile, all construct reached CR values greater than .88, which exceed the suggested value of .60 recommended by [21] and all construct reached AVE reliability evaluation based on AVE satisfied the recommended value of .50 [22]. In summary, these results indicate that all the constructs in the model demonstrate high internal consistency.

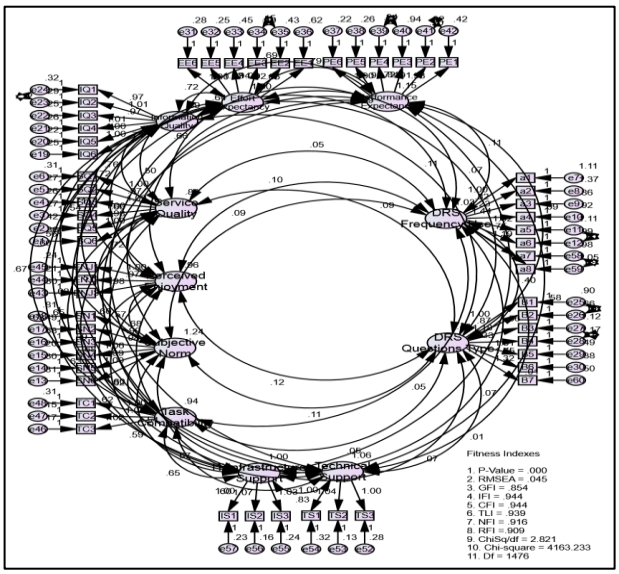

Figure 4: Measurement model of overall construct

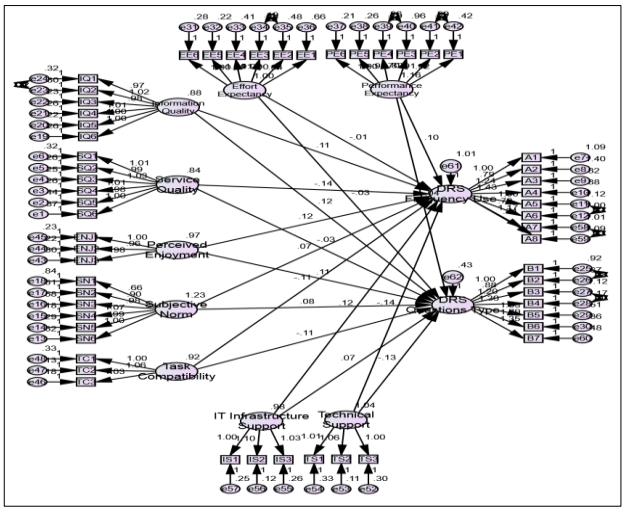

Figure 5: Results of Structural Modeling Analysis

Structural equation modeling was used to test all the hypothesized relationships (see Fig. 5). The parameter estimates and critical ratio values for the research model are presented in Table II. As can be seen, 10 of the 18 research hypotheses were supported. Hypothesis H1a, H3a, H5a, H6a, H7a, H1b, H3b, H5b, H6b, and H7b were statistically significant and in the hypothesized direction, while hypotheses H2a, H4a, H8a, H9a and H2b, H4b, H8b and H9b were rejected because they were not statistically significant.

Table II: **Testing of Hypotheses Using Standardized Estimates (Hypothesized Model)**

				Estimate	S.E.	C.R.	P	Remarks
H1a	DRS frequency use	<---	PE	0.1	0.034	2.909	0.004	Supported
H2a	DRS frequency use	<---	EE	-0.014	0.037	-0.374	0.708	Not supported
H3a	DRS frequency use	<---	IQ	0.109	0.039	2.778	0.005	Supported
H4a	DRS frequency use	<---	SQ	-0.14	0.04	-3.477	***	Not supported
H5a	DRS frequency use	<---	PEN	0.118	0.038	3.091	0.002	Supported
H6a	DRS frequency use	<---	SN	0.066	0.033	1.998	0.046	Supported
H7a	DRS frequency use	<---	ITS	0.118	0.037	3.174	0.002	Supported
H8a	DRS frequency use	<---	TS	-0.138	0.036	-3.783	***	Not supported
H9a	DRS frequency use	<---	TC	-0.108	0.039	-2.799	0.005	Not supported
Hb1	DRS question types	<---	PE	0.043	0.023	1.920	0.055	Supported
Hb2	DRS question types	<---	EE	-0.033	0.024	-1.369	0.171	Not supported
Hb3	DRS question types	<---	IQ	0.119	0.026	4.553	***	Supported
Hb4	DRS question types	<---	SQ	-0.031	0.026	-1.186	0.236	Not supported
Hb5	DRS question types	<---	PEN	0.105	0.025	4.167	***	Supported
Hb6	DRS question types	<---	SN	0.08	0.022	3.653	***	Supported
Hb7	DRS question types	<---	ITS	0.067	0.024	2.756	0.006	Supported
Hb8	DRS question types	<---	TS	-0.125	0.024	-5.151	***	Not supported
Hb9	DRS question types	<---	TC	-0.107	0.026	-4.176	***	Not supported

Note: The standardized parameter estimates (β) were statistically significant based on the critical ratio (CR) value of ± 1.645 ($p<0.05$) for a one-tailed test of significance.

5. CONCLUSIONS

The research question for this study focused on the factors that affect the acceptance and usage DRS in Malaysian research university libraries. A conceptual model was proposed that included performance expectancy, effort expectancy, information quality, service quality, perceived enjoyment, subjective norms, IT infrastructure support, technical support and task compatibility as the main determinants. The results showed that all the direct relationships between performance expectancy, information quality, perceived enjoyment, subjective norms and IT infrastructure support with DRS acceptance were supported. The study emphasizes that the use of DRS is influenced by the investment of libraries in IT infrastructure, performance expectancy of DRS, and perceived enjoyment. Besides that, since the effect of information quality on DRS use has been confirmed, librarians should try to increase user satisfaction by fulfilling user information needs. In addition, it is suggested that librarians try to focus more on the social context. This study was conducted in an effort to validate the

findings of other studies in a different context by examining the acceptance of DRS in Malaysian research university libraries. Users from different cultures may show different interests in judging a technology. For future research studies could be conducted at others public universities or private universities library. Perhaps an extension of this research examining DRS use across the others public universities or private universities settings can shed more clarity of the usage behavior of DRS.

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